

REMARKS

Claims 1-26 are pending in the present application.

The present invention provides, in part, a bending apparatus for bending at least one glass sheet placed on a bending mold into a desired shape by heating in a furnace, which comprises a bending mold for placing at least one glass sheet thereon, a tunnel-like heating furnace through which the bending mold is conveyed, a first group of a plurality of heating elements fixed on an inner wall of the heating furnace, and a radiation-heating device having a second group of a plurality of heating elements placed separably from the inner wall surface of the heating furnace,

wherein said second group of a plurality of heating elements of said radiation-heating device are mounted on a *heater rack* that may be moved to increase or decrease the distance between said second group of a plurality of heating elements and said glass sheet, and

wherein the temperature of each heating element of said second group of a plurality of heating elements may be individually controlled (Claim 1).

Applicants submit that GB 836,560 (GB '560), individually or combined with Kamata, does not affect the patentability of the same for the following reasons.

The rejections of: (a) Claims 1-4, 11, 12, 17, and 24 under 35 U.S.C. §102(b) over GB '560; (a) Claims 1-4, 11, 12, 17, and 23 under 35 U.S.C. §103(a) over GB '560, and (b) Claims 5, 13, 18, and 21 under 35 U.S.C. §103(a) over GB '560 in view of Kamata, are obviated by amendment.

Applicants note that GB '560 fails to disclose or suggest (a) a *second* group of a plurality of heating elements that are mounted, and (b) that the second group of heating elements is mounted on a *heater rack*.

In the presently claimed invention, a large number of heating elements, making up the “second group,” are mounted on the movable structure (e.g., the glass sheet-exposed surface of the heater rack as shown in Figures 2, 3, and 4 of the present application) each of which may be individually controlled. Accordingly, the apparatus of the present invention offers a second means by which the temperature distribution of the glass sheet may be controlled in addition to the distance between heat source and object: precise and individual control of the calorific power of each heating element.

By combining the two aforementioned means to control the temperature distribution of the glass sheet, the present apparatus eliminates the need to provide individual elevating devices (inclusive of control elements, such as a drive motor and control computer) for each heating element. Moreover, by mounting a large number of heating elements on a movable structure, the plurality of heating elements can be rapidly moved toward or away from the glass sheet in a single motion.

In contrast, GB '560 employs a series of heaters (designated as “88” in Figure 7) in a linear (one-dimensional) arrangement for local heating to facilitate bending to form a portion having a sharp curvature. This heater arrangement disclosed by GB '560 is used to selectively bend portions of the glass sheet that are difficult to bend by conventional heating techniques. However, this limited local heating technique only provides for a limited scope of achievable shapes. More importantly, these local heaters do not provide a temperature distribution as in the present invention. As such, the heaters “88” disclosed by GB '560 do not correspond to the “second group of heating elements” recited in the claimed invention.

The Examiner apparently disregards the foregoing and continues to classify heaters 88 as being the equivalent of the claimed second group of heaters. Referring to lines 62-78 (apparently of page 1) of GB '560 the Examiner asserts that this reference discloses that the heaters 88 are raised and lowered by a support housing, which would read on the previous claim limitation of a structure. However, the section referred to by the Examiner makes no reference to heaters 88. Nonetheless, on page 3, lines 22-42 of GB '560 disclose that the crease heaters 88 are mounted *in pairs* via cables extending through slots in the roof of the heating apparatus and the cables are entrained about a pulley (see also Figure 9). Therefore, it appears that the Examiner is broadly interpreting the term "plurality" in the present application as embracing "two or more heating elements" and the term "a structure" to embrace "a pulley."

However, Applicants disagree with this characterization by the Examiner. In particular, Applicants disagree with the interpretation of the term "a structure" to embrace "a pulley" as used in GB '560. As referred to above, at page 3, lines 22-42 of GB '560 the orientation and mounting of the crease heaters 88 is described. At this point and illustrated in the figures, the crease heaters 88 are mounted in via pulleys wherein a single pulley is used "for each crease heater extremity." (page 3, lines 34-36 of GB '560). In this arrangement, each pulley requires its own vertical driving device and, therefore, there are as many driving devices as there are heaters. Further, as evidenced in Figures 7 and 9 of GB '560, each heating element is independently raised and lowered.

As stated above, the requirement for independent driving apparatus for each heater is precisely one of the problems pervading the art that the present inventors sought to remedy. As such, it was an object of the present invention to avoid the many problems arising due to complicated construction and complicated operation. Applicants address this object by

mounting the plurality of heating elements onto a heater rack, which is neither disclosed nor suggested by either GB '560 or Kamata.

As stated above, the heaters in GB '560 that the Examiner alleges is equivalent to the claimed second group of heaters are mounted on a network of pulleys where each pulley supports the extremity of two adjacent heaters (see page 3, lines 22-42 of GB '560). Such a network is distinct from a heater rack in that by mounting the plurality of heaters on a heater rack the distance between the heating elements and the glass sheet can be readily adjusted for all the heaters mounted thereon by the act of single driving mechanism. Put more precisely, by constructing the apparatus as claimed in which the plurality of heaters are mounted on a heater rack the plurality of heating elements can be raised or lowered simultaneously and quickly, the desired temperature distribution may be readily obtained, and the elevating device for the heater rack (e.g., drive motor and/or control computer) can be simplified to reduce cost and simplify construction. These advantages are not found in the intricate network of pulleys and drive mechanisms disclosed by GB '560.

In view of the foregoing, Applicants submit that GB '560 fails to disclose all the limitations of the claimed invention and, therefore, cannot anticipate the claimed invention.

Moreover, GB '560 cannot even support a *prima facie* case of obviousness, even when combined with the disclosure of Kamata. MPEP §2142 states: "To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation... to modify the reference... Second, there must be a reasonable expectation of success. Finally, the prior art reference... must teach or suggest all the claim limitations." As established above, GB '560 fails to disclose or suggest mounting the second group of heating elements on a heater rack. Further, this reference provides no disclosure or suggestion of how their apparatus could or should be modified to accommodate a heater rack

rather than the pulley system disclosed therein. As such, GB '560 on its own cannot even support a prima facie case of obviousness.

Kamata is cited as disclosing "heating elements having a heating plate have heater wires." However, Kamata does not compensate for the aforementioned deficiencies in the disclosure of GB '560. Specifically, Kamata is also silent with respect to a *second* group of a plurality of heating elements that are mounted on a heater rack.

For the foregoing reasons, Applicants submit that the claimed invention is not anticipated by or obvious in view of GB 836,560 (GB '560), individually or combined with Kamata. Acknowledgement that these grounds of rejection have been withdrawn is requested.

Applicants submit that the present application is now in condition for allowance.  
Early notification of such action is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,  
MAIER & NEUSTADT, P.C.  
Norman F. Oblon



Vincent K. Shier, Ph.D.  
Registration No. 50,552

Customer Number

**22850**

Tel: (703) 413-3000  
Fax: (703) 413-2220  
(OSMMN 08/03)